Memo

Date:	Thursday, September 24, 2020
Project:	CMOM 2020 Update – Program Support
To:	Joe Barnes, Trenton Foglesong, Waldo Margheim
From:	HDR
Subject:	Stormwater WIFIA Analysis Support for Unified Government of Wyandotte County

The renewal projections were developed utilizing historical UG inspection data and renewal records to project future needs. A previously developed renewal decision and prioritization model was also used for the projection estimates. The model aided in the system evaluation including processing the CCTV condition data, assigning risk scores and recommended next actions including costs based on the CCTV findings.

The evaluation does not address renewal for flood pump stations, lined channels, natural channels or additional activities for stormwater infrastructure operations and maintenance. The current renewal projections do not include increasing CCTV production. Renewal projections presented herein are based on UG's current management strategy and historical levels of reactive and proactive inspection and renewal work. The total stormwater program renewal needs estimate for the next 5 years is $17.3 million. Even with no increase in proactive inspection and renewal work, the effort to work through the existing backlog and address newly identified needs over the five year period will stress Engineering staff time.

The memo briefly describes the main assumptions for the renewal projections, summarizes the projections and outlines next steps.

Main Assumptions

1. Inspection Data or Age Based Renewal

The majority of the stormwater system, 96.4% has known material information. The system is comprised of mostly reinforced concrete pipe followed by CMP and plastic. System age based on installation dates is currently unknown for over 90% of the stormwater and stormwater-to-combined pipes. An estimate based on the sanitary system was completed, however a review of this data indicated there are many uncertainties present in this approximation. Due to the uncertainty in this interpolation, an age based approach is not recommended to be used for renewal projections.

2. Current CCTV Production

The stormwater system has had about 22% inspected including acceptance inspections. On average, UG has inspected and coded around 3.4 miles per year. Historical CCTV rates were used to help project the amount of renewal that will be identified if no additional stormwater inspection

resources are added, i.e. if UG continues its current CCTV strategy, which is primarily reactive in nature, along with proactive inspection and renewal in conjunction with street renewal efforts.

3. Backlog

The backlog was analyzed in three separate parts which included work order (WO) backlog, structure backlog and model estimated backlog. The current work order backlog was estimated using open work orders and estimated typical unit costs. The structure backlog was estimated using open work orders similar to the pipes.

Historically, UG investments in the stormwater infrastructure renewal have been reactive focused on emergency response or pipes near an emergency response. The modeled backlog is the additional estimated budget needed to begin to move towards a more proactive management of the stormwater infrastructure. The model backlog utilized current model renewal estimates of processed CCTV inspection data (pipes on backlog or previously repaired were excluded).

Total Backlog $7.1M:

- WO Pipe Backlog: Determined based on the current number and type of pipe work orders that need to be completed.
  4.9 Miles, $2.8 M
- Structure Backlog: Determined based on the current number and type of structure work orders that need to be completed.
  95 structures, $1.1M
- Model Estimated Backlog: Determined by evaluating all CCTV data through a renewal decision and prioritization model. Pipes identified by the model as requiring proactive renewal, but have not been repaired and are not on a work order were included in the backlog. For the purposes of projecting renewal needs, there are considered to be pipes that are not at a state of imminent failure but will require renewal in the near future due to structural deficiencies.
  8 Miles, $3.1M

Table 1 – Work Order Backlog Summary

Backlog Group	Rehabilitation Type	Miles/Count	Percentage Of Total	Cost per Mile for Pipe Requiring Rehab[A]	Total Backlog Cost
Work order Backlog[b]	Replace	2.2	45%	$910,000	$2,010,000
	CIPP	1.5	31%	$150,000	$230,000
	Repair (Trenchless + Open Cut)	1.2	24%	$540,000	$640,000
	Subtotal	4.9	100%	$590,000	$2,880,000
Structure Backlog		95 structures			$1,180,00
Model Estimated Backlog[b]	Replace	0.7	8%	$1,550,000	$1,040,000
	CIPP	5.2	65%	$180,000	$910,000
	Repair (Trenchless + Open Cut)	2.1	27%	$540,000	$1,150,000
	Subtotal	8.0	100%	$390,000	$3,100,000
Total		**12.9 miles (95 structures)**			**$7.1M**
[a]Based on unit costs rates, does not include contingency					

[b]Cost per mile estimates differ between wo backlog and model estimates because the size distribution of the pipes that make up the two backlog categories are different. The model estimated backlog includes larger diameter pipes.

4. Model

The previously developed renewal decision and prioritization model was used to evaluate the past CCTV and assign risk scores and recommended next actions based on the CCTV findings. The model was compared to the backlog for validation. The model produced the current model estimated backlog and the yield rate (35%) for the renewal projections. The yield rate can defined as the percentage of pipes projected to require renewal that will be identified through future CCTV efforts.

Projection Estimates

Utilizing the above assumptions 5-year renewal projection estimates were completed. For the current production of 3.4 miles for additional CCTV per year and the renewal rate of 35% indicated by the model it is estimated that an additional 1.2 miles per year will require renewal through current CCTV strategy.

The projection estimates were projected based on the following information:

- Renewal Miles 1.2 additional identified per year through current CCTV strategy.
- Renewal yield 35%
- Renewal Cost and % Breakdown of type of repairs based on current UG strategy and historical distribution of renewal action types. UG's historical stormwater renewal strategy has included relatively more pipe replacements than trenchless renewal (lining). Model estimates predicting a higher percentage of lining than replacement; this estimate of future renewal strategies was adjusted to align with UG's historical renewal strategies, i.e. the percentage of pipes renewed through trenchless methods versus open cut replacement.

Table 2 – Rehabilitation Estimate Percentages (Based on current strategy)

Rehabilitation Type	Percentage
Replace	45%
CIPP	31%
Repair (Trenchless + Open Cut)	24%
Total	100%

- Additional Structures
    i. Replacement of 33 Structures

  Structural renewal was based on the assumption of replacing 1 structure for every pipe replacement. For the 1.2 miles of estimated renewal 45% was estimated to be replacement pipe (0.5 miles). The average stormwater pipe length was found to be 87 LF per pipe which equates to approximately 33 stormwater pipes for replacement and thus 33 replacement structures each year.

- Contingency

Current program: 20% Contingency was applied. The 20% contingency was not applied to current backlog, since the final actions have been determined by UG staff.

- Emergency Estimates
  $350,000 per year for additional renewal found through emergency activities was added to the projection totals.

The total stormwater program renewal needs estimate for the next 5 years is $17.3 Million. Details are provided in the below table and figures.

Table 3 – Projection Estimate Summary Table

Description	Miles/Structure count	Estimate Total
Total Backlog	12.9 miles (95 structures)	$7.1M
Backlog (WO)	4.9 Miles	$2,880,000
Model Estimates (Additional backlog)	8.0 Miles	$3,100,000
Structure	95 structures	$1,180,000
5-YR Estimated Annual Renewal Total Added each year	1.2 Miles	$700,000
5-YR Estimated Structural Renewal Added each year	33 structures	$650,000
5-YR Estimated Renewal Total Including Emergency, Contingency & Backlog	18.8 Miles (260 structures)	$17.3M

Figure 1. 5 Year Renewal Projection Estimates

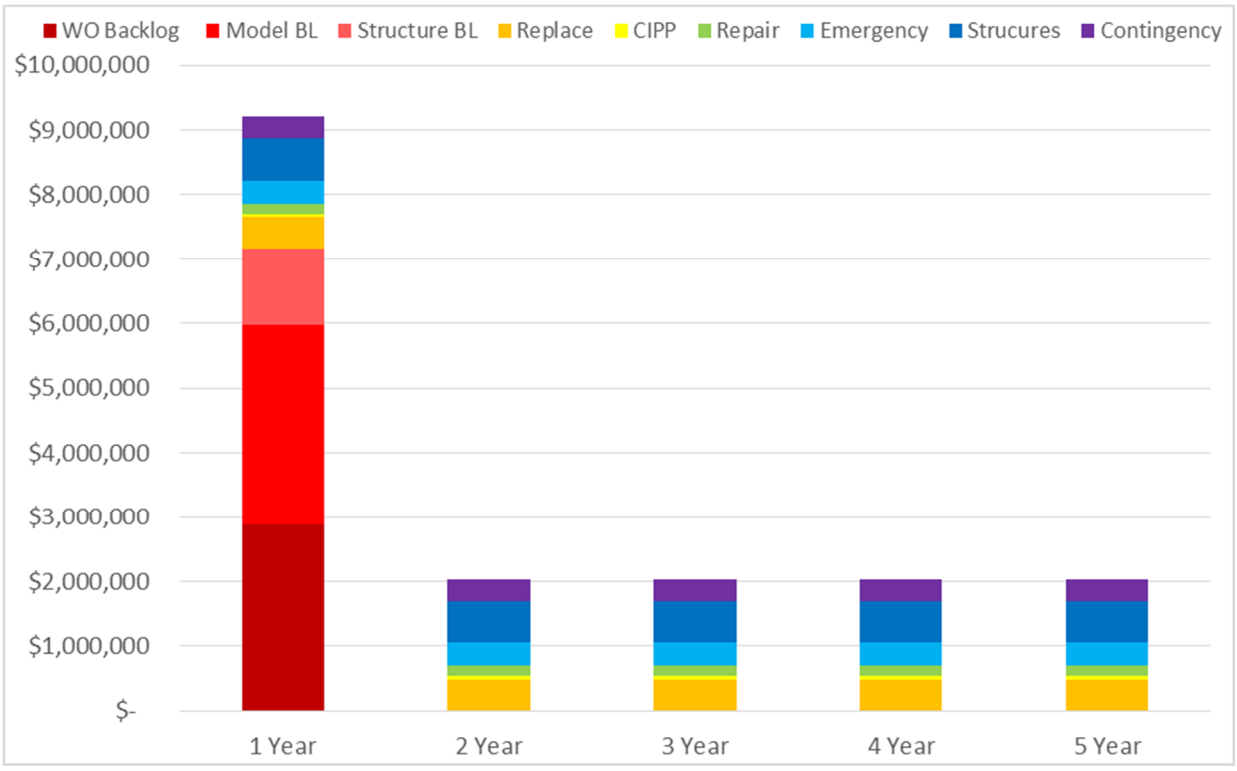
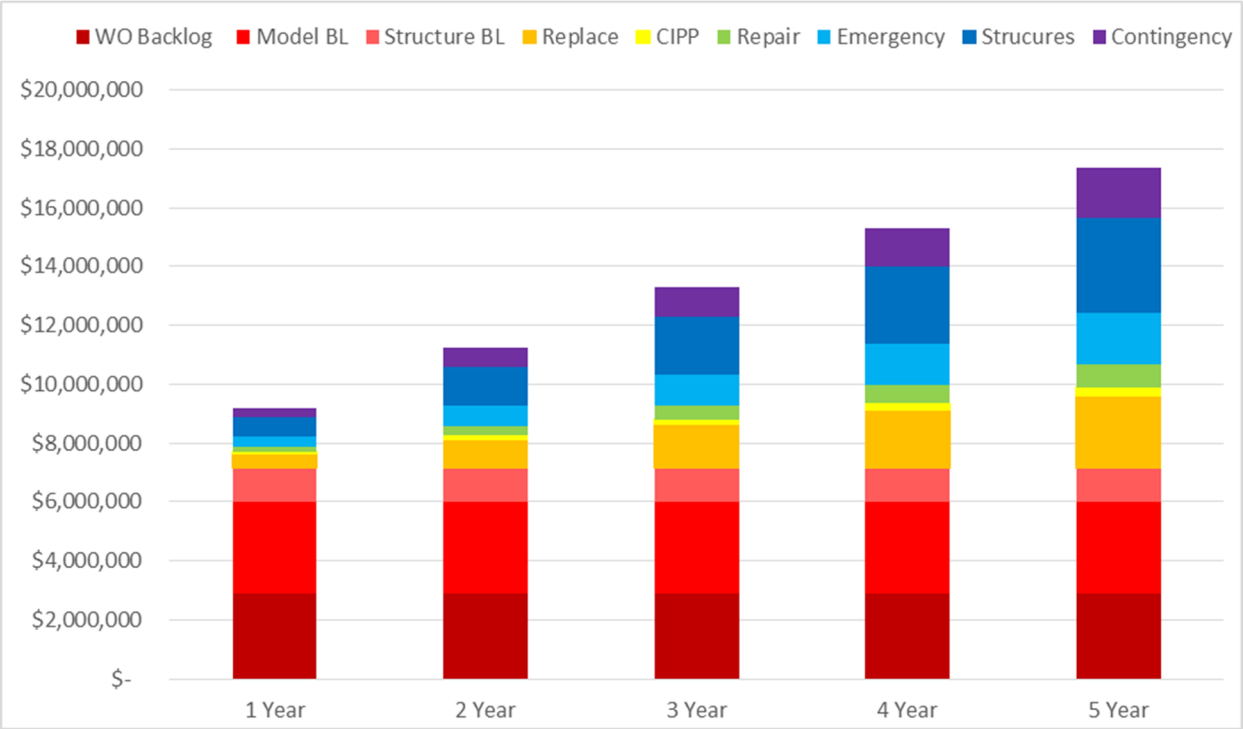


Figure 2. Accumulated 5 Year Renewal Projection Estimates



Next Steps

Confirm the assumptions for the current program projections with UG. Note that the current renewal projections do not include increasing CCTV production or estimates for a full proactive inspection program. Even with no increase in proactive inspection and renewal work, the effort to work through the existing backlog and address newly identified needs over the five year period will stress Engineering staff time.

If a larger proactive stormwater inspection and renewal program is implemented in the future, it will require either contracted resources for inspection, or the addition of significantly more UG internal CCTV resources. If a contracted program is implemented, along with the program capital costs, it will result in additional workload that will impact UG's existing engineering and O&M staff resources. The following is a summary of the resource impacts of adding this program:

- Additional Engineering staff time to manage the proactive CCTV program.
- Additional Engineering staff time to manage renewal activities, in both the design and construction phases.
- Additional costs associated with emergency repairs (assumed to be contracted) that will be identified as more CCTV data is collected. It is anticipated this will likely include both an increase in contracted repairs and additional construction staff and equipment to respond to emergencies.
- Additional data management resources to assist with Lucity updates associated with additional CCTV data and renewal.